

## RECOMMENDATIONS

These studies have pointed to some potentially important and useful physiological changes in the blue crab populations of the A/P Estuary that may help to explain some of the deleterious changes that are believed to be occurring in this ecosystem. Monitoring studies should continue to collect information on the antibacterial activity and hemocyanin levels in blue crab populations in various parts of the A/P Estuary in order to substantiate the site-related immunological and physiological differences that have been identified in the present study.

In order to definitively determine the importance of man-made changes to these effects, controlled studies need to be performed to ascertain the mechanism(s) responsible for the reduced antibacterial activity and hemocyanin levels in crabs from the riverine areas of the Albemarle-Pamlico Estuary. This should include exposure of clinically healthy blue crabs from a single, control site (e.g., Core Sound) to water from riverine and oceanic areas, in order to experimentally confirm our findings that crabs exposed to riverine water are more likely to have lower immunocompetence and increased prevalence of shell disease. The importance of salinity per se as an influence on immunocompetence should also be examined and the identification of low salinity sites that are at low risk for shell disease should be included if possible.

In a complimentary study, blue crabs from the Pamlico River should be placed into tanks at different geographic sites to determine the reversibility of the changes associated with exposure to the high-risk-of-shell-disease environments.

Special emphasis should also be placed on nutritional status, since inadequate nutrition has been associated with both shell disease and depressed hemocyanin levels in other crustaceans. Conditions that may lead to poor nutrition (hypoxia or other adverse water quality factors, decreased prey abundance, etc.) should also be examined.

Once putative water quality factors have been identified that are associated with an increased risk of shell disease, controlled experimental studies should be performed to verify the importance of these factors to blue crab health. With such knowledge, management decisions about regulating the input of various substances into the Albemarle-Pamlico Estuary might then be made.